

Oil and Gas INNOVATION[®]

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Optimized Solids Control – Improved Environmental Sustainability

Traditional shale shakers have been the preferred equipment in solids control for nearly a century now. When the MudCube was first introduced as an alternative in 2012 it was the first fundamental innovation done in this field in 50 years. Initially the MudCube was regarded as too expensive and too complicated by many. However, since then the MudCube has been greatly improved and have gained wide acceptance in many oil and gas regions with more than 200 units sold.

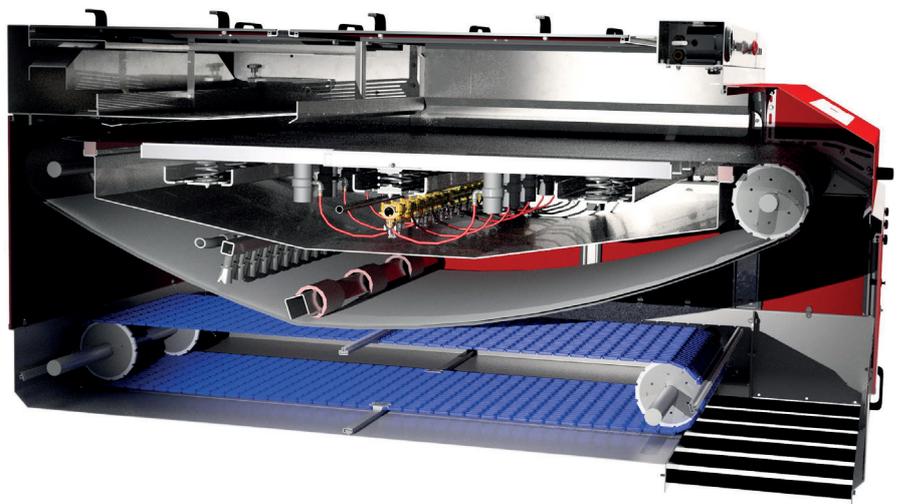
With the introduction of the second generation MudCube in 2018, both the complexity and price has gone down making it an obvious replacement to the traditional shaker.

A natural question to ask is why would anyone introduce a novel equipment like the MudCube to the critical drilling operation when we can continue to do what we always have done? According to MudCube customers the answer lies in the saving of cost by reduced mud consumption and reduced drilling waste but also by the improved drilling performance.

Recent third-party assessments have concluded that the MudCube also reduces the CO₂-footprint of the operation. This is a benefit that is becoming more and more in focus for companies operating in the oil and gas industry. By installing the MudCube the third-party assessment has found that the CO₂e (CO₂-equivalent) emission may be reduced by a factor of 40-75% compared to a traditional shaker operation. This is definitely a step in the right direction.

The step change

What is the big difference between a shale shaker and the MudCube apart from appearance? After all they both do the same job (although in a different way) and have to adhere to the same physical laws.... Well, the most apparent



difference is that the MudCube combines a high air flow through a rotating filterbelt with microvibration compared to the vibrating screen(s) of a shaker.

The MudCube do use vibration to break surface tensions of the liquid and to avoid near size blinding just as you do on a shaker. However, while a shaker need to vibrate the screens to transport cuttings forward to the cuttings discharge, the MudCube has the

rotating filterbelt conveying the cuttings to the cuttings discharge. As a result, the MudCube can make do with less than one tenth of the G-forces imposed on the cuttings compared to the level on a shale shaker.

The high G-forces used on a shaker will inherently grind the cuttings while on top of the screen. This will again lead to increased formation of fines (i.e., low gravity solids) in the solids separation process. The low G-forces imposed on a MudCube prevents fines from being generated resulting in a better quality mud. Consequently, less wear is seen on mud pumps and other equipment in the mud flow loop.

The grinding of cuttings happening on a shaker will increase the surface area of the cuttings to which drilling fluid can attach. Consequently, the total volume of mud lost on cuttings will increase compared to using a MudCube.

Reduced cost through mud savings and reduced waste

Another unique quality separating the MudCube from a shaker is the vacuum air being pulled through the rotating filterbelt. The air flow through the MudCube filterbelt helps separating mud from cuttings and contributes to further drying of the cuttings before it leaves the belt at the cuttings discharge.





Typically, field data from MudCube operations throughout the world indicate a reduction in lost mud on cuttings in the area 30 to 40% when comparing head-to-head with shale shakers. In one case in Siberia where the comparison was done by an objective 3rd party, the reduction in mud lost on cuttings when replacing shakers with MudCubes was measured to 85%!

Lower mud-loss on cuttings can in most cases be transferred directly to cost savings through reduced mud consumption and reduced waste volume. The monetary value of these savings will vary from one operation to the other. However, it is repeatedly seen that cost reductions achieved from operating the MudCubes quickly surpass the investment cost of installing them.

When we look at solids control from an environmental sustainability view angle it may seem obvious that the savings in MudCube operations are likely to be positive. The question, however, is whether net result is positive or not when taking all relevant factors into account. The independent consultancy company Carbon-Zero (A division of Data Engineering Projects Ltd) have done a technical carbon emissions comparative assessment of a typical solids control operation using traditional shale shakers

compared to MudCubes. Both offshore and land operations were assessed separately but, in both cases, there are significant savings to be made by using the MudCube.

The figures will vary depending on how the drilling waste is handled and whether the drilling is done with oil-based or water-based mud programs. In an average well, a dual MudCube operation is calculated to save approx. 130 metric tonnes of CO₂ e (equivalents) compared to a similar operation with traditional shakers. Based on a conservative estimated number of MudCubes in actual operation in 2020, Carbon Zero have found that a total saving in operating the MudCube fleet is 21 221 metric tonnes of CO₂. That equals the annual average emission from approx. 16500 European cars or from producing electricity for close to 100000 homes! An impressive number showing that even the smaller steps do matter.

Improving the working environment

Lately there has been an increased focus on the health risk of being exposed to the fumes and gasses emitted from drilling fluids, especially the oil-based ones. The shaker area on a rig is one of the most exposed areas

and with high mud temperatures it can be quite extreme. When combined with high noise levels and heavy vibrations coming from a shaker operation, the working conditions are far from satisfactory and are likely to represent a significant health risk for the workers exposed to these conditions.

Since the MudCube is enclosed and works under negative pressure, no vapours or gasses can escape even with the front hatch open. Since the MudCube also have a low noise level and no structural vibrations it represents a huge improvement in the working conditions compared to a traditional shaker operation. This also becomes an operational benefit when drilling operations in rural areas puts heavy restrictions on the operation in terms of odours, noise, and vibrations.

Field proven

With more than 10 years of field experience the MudCube has been exposed to all thinkable ambient conditions ranging from the Saudi desert to the extreme arctic environment in Siberia. With more than thousand wells drilled with the MudCube in all main oil and gas regions in the world, it has been exposed to a wide variety of formations, mud programs and drilling strategies. It is in the true meaning of the word “field proven”.

Even though the MudCube has been successfully operated in field for more than 10 years it is still regarded as a “novel” technology by some. However, when considering the improvements achieved by the MudCube in solids control operations it seems to be the prudent choice for future operations. And now that sustainability and CO₂ footprint are factors to be seriously considered, solids control equipment evaluations may turn out differently than they did before. •

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